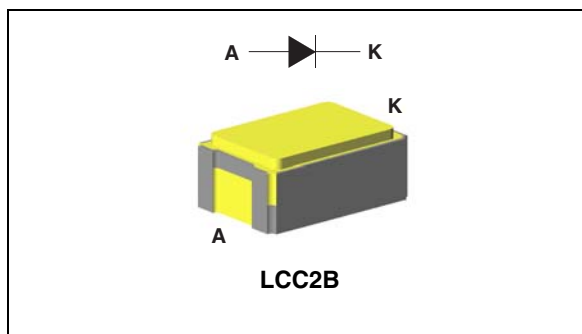


Aerospace 6 A fast recovery rectifier

Features

- Aerospace applications
- Surface mount hermetic package
- High thermal conductivity materials
- Very small conduction losses
- Negligible switching losses
- Extremely fast switching
- Low forward voltage drop
- Package mass: 0.18 g
- Target radiation qualification
 - 150 krad (Si) low dose rate
 - 3 Mrad (Si) high dose rate
- ESCC qualified



Description

This power ultrafast recovery rectifier is designed and packaged to comply with the ESCC5000 specification for aerospace products. It is housed in a surface mount hermetically sealed LCC2B package whose footprint is 100% compatible with industry standard solutions in D5B.

The 1N5811U is suitable for switching mode power supplies and high frequency DC to DC converters such as low voltage high frequency inverter, free wheeling or polarity protection .

Table 1. Device summary⁽¹⁾

Order code	ESCC detailed specification	Quality level	Lead finish	EPPL	$I_{F(AV)}$	V_{RRM}	$T_{j(max)}$	$V_F(max)$
1N5811UB1	-	Engineering model	Gold plated	-	6 A	150 V	175 °C	0.995 V
1N5811U01B	5101/013/11	Flight part	Gold plated	Y				
1N5811U02B	5101/013/12	Flight part	Solder dip	Y				

1. Contact ST sales office for information about the specific conditions for products in die form and QML-Q versions.

1 Characteristics

Table 2. Absolute ratings (limiting values)

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	150	V
$I_{F(RMS)}$	Forward rms current	10	A
$I_{F(AV)}$	Average forward rectified current	$T_c = 135\text{ °C}, \delta = 0.5$ 6	A
I_{FSM}	Forward surge current	$t_p = 8.3\text{ ms sinusoidal}$	A
		$t_p = 10\text{ ms sinusoidal}$	
T_{stg}	Storage temperature range	-65 to + 175	°C
T_j	Maximum operating junction temperature	175	°C
T_{sol}	Maximum soldering temperature ⁽¹⁾	245	°C

1. Maximum duration 5 s. The same package must not be resoldered until 3 minutes have elapsed.

Table 3. Thermal resistance

Symbol	Parameter	Value	Unit
$R_{th(j-c)}^{(1)}$	Junction to case	6.5	°C/W

1. Package mounted on infinite heatsink

Table 4. Static electrical characteristics

Symbol	Parameter	Tests conditions	Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse current	$T_j = 25\text{ °C}$	-	-	2	μA
		$T_j = 125\text{ °C}$			30	
		$T_j = 25\text{ °C}$	-	-	10	μA
		$T_j = -65\text{ °C}$			10	
$V_F^{(2)}$	Forward voltage	$T_j = 25\text{ °C}$	-	-	865	mV
		$T_j = 25\text{ °C}$	-	-	900	
		$T_j = 125\text{ °C}$	-	-	800	
		$T_j = -65\text{ °C}$	-	-	1075	
		$T_j = 25\text{ °C}$	-	-	955	

1. Pulse test : $t_p = 5\text{ ms}$, $\delta < 2\%$

2. Pulse test : $t_p = 680\text{ }\mu\text{s}$, $\delta < 2\%$

To evaluate the conduction losses use the following equation:

$$P = 0.68 \times I_{F(AV)} + 0.03 I_{F(RMS)}^2$$

Table 5. Dynamic characteristics

Symbol	Parameter	Test conditions	Min.	Typ	Max.	Unit
t_{RR}	Reverse recovery time	$I_F = I_R = 1\text{ A}$, $I_{RR} = 0.1\text{ A}$, $di/dt = -100\text{ A}/\mu\text{s}$, (min)			30	ns
		$I_F = 1\text{ A}$, $V_F = 30\text{ V}$, $di/dt = -50\text{ A}/\mu\text{s}$,			35	
V_{FP}	Forward recovery voltage	$I_{FM} = 500\text{ mA}$			2.2	V
t_{FR}	Forward recovery time	$I_{FM} = 500\text{ mA}$, $V_{FR} = 1.1 \times V_F$			15	ns
C_j	Diode capacitance	$V_R = 10\text{ V}$, $F = 1\text{ MHz}$			60	pF

Figure 1. Forward voltage drop versus forward current (typical values)

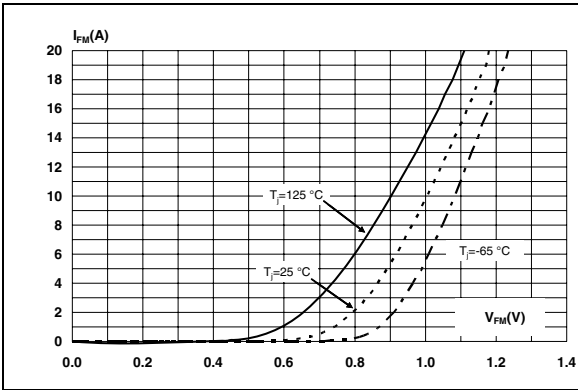


Figure 2. Forward voltage drop versus forward current (maximum values)

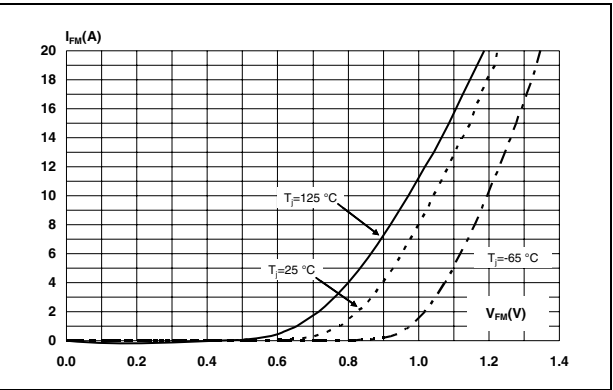


Figure 3. Reverse leakage current versus reverse voltage applied (typical values)

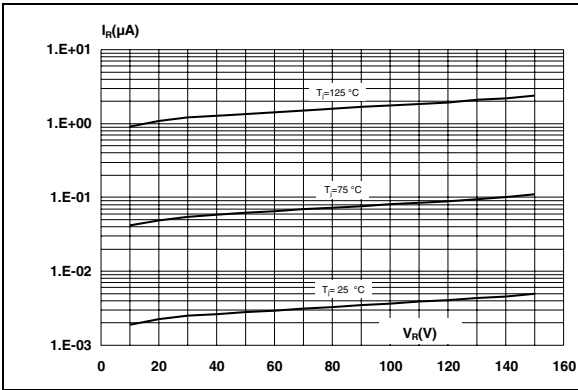


Figure 4. Relative variation of thermal impedance, junction to case, versus pulse duration

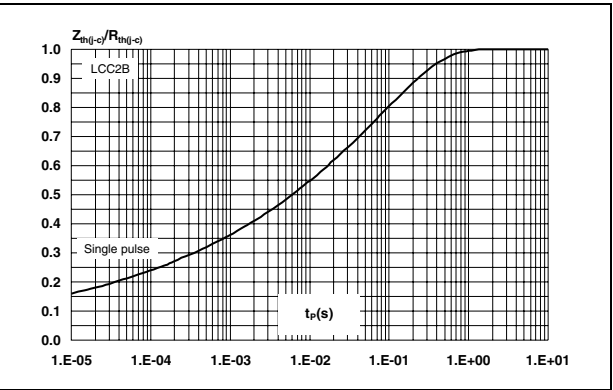
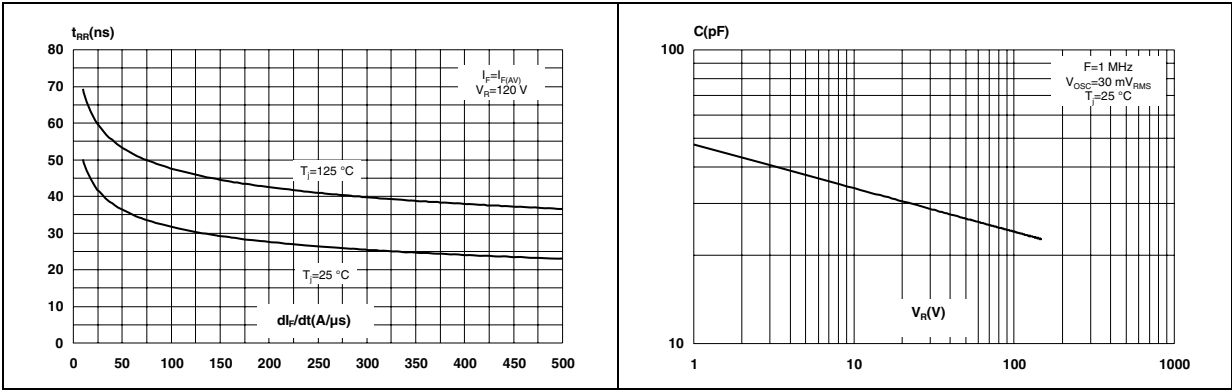


Figure 5. Reverse recovery time versus di_F/dt Figure 6. Junction capacitance versus reverse voltage applied (typical values)



2 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

Table 6. Leadless chip carrier 2 (LCC2B) package dimensions

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A ⁽¹⁾	2.04	2.23	2.42	0.080	0.088	0.095
B	5.27	5.4	5.6	0.207	0.213	0.220
C	3.49	3.62	3.82	0.137	0.143	0.150
D	1.71	1.90	2.09	0.067	0.075	0.082
E	0.48	-	0.71	0.019	0.028	0.028
F	-	1.4	-	-	0.055	-
G	-	3.32	-	-	0.131	-
H	-	1.82	-	-	0.072	-
I	-	0.15	-	-	0.006	-
r1	-	0.15	-	-	0.006	-
r2	-	0.20	-	-	0.008	-

Note 1: The anode is identified by metallization in two top internal angles and the index mark.

1. Measurement prior to solder coating the mounting pads on bottom of package

3 Ordering information

Table 7. Ordering information⁽¹⁾

Order code	ESCC detailed specification	Package	Lead finish	Marking	EPPL	Mass	Packing
1N5811UB1	-	LCC2B	Gold plated	11UB1	-	0.18 g	Waffle pack
1N5811U01B	5101/013/11		Gold plated	11U01B	Y	0.18 g	
1N5811U02B	5101/013/12		Solder dip	11U02B	Y		

1. Contact ST sales office for information about the specific conditions for products in die form and QML-Q versions.

4 Revision history

Table 8. Document revision history

Date	Revision	Changes
27-Jul-2009	1	First issue.
25-Mar-2010	2	Updated ESCC status in Features . Added footnote to Table 3 .

Please Read Carefully:

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

UNLESS EXPRESSLY APPROVED IN WRITING BY AN AUTHORIZED ST REPRESENTATIVE, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS "AUTOMOTIVE GRADE" MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER'S OWN RISK.

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2010 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com